

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
4 August 2005 (04.08.2005)

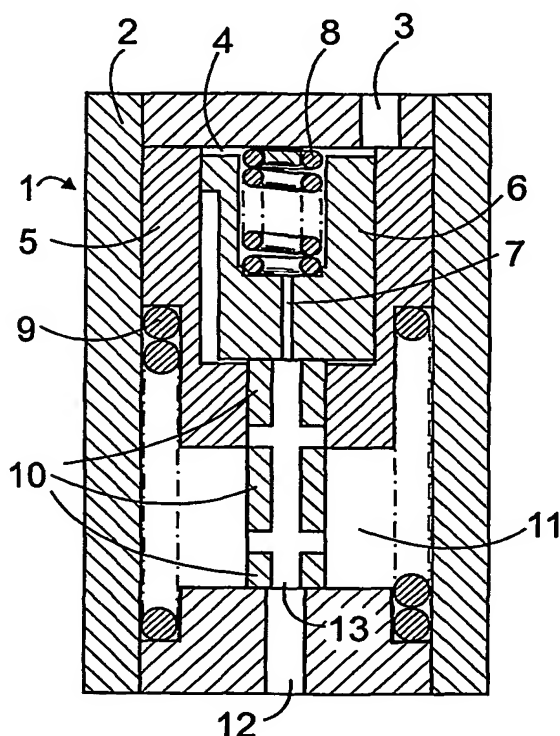
PCT

(10) International Publication Number  
**WO 2005/071251 A1**

- (51) International Patent Classification<sup>7</sup>: **F02M 45/12**
- (21) International Application Number:  
PCT/FI2004/000812
- (22) International Filing Date:  
31 December 2004 (31.12.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
20040099 23 January 2004 (23.01.2004) FI
- (71) Applicant (for all designated States except US): **WÄRTSILÄ FINLAND OY** [FI/FI]; Tarhaajantie 2, FI-65380 Vaasa (FI).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **LEHTONEN, Kai** [FI/FI]; Gerbyn rantatie 9 A 3, FI-65280 Vaasa (FI).
- (74) Agent: **AWEK INDUSTRIAL PATENTS LTD OY**; P.O.Box 230 (Lautatarhankatu 6), FI-00101 Helsinki (FI).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:  
— with international search report

[Continued on next page]

(54) Title: **DEVICE FOR FUEL INJECTION RATE SHAPING**



(57) Abstract: The present invention relates to fuel injection in internal combustion engines and to fuel rate shaping. Especially, the invention relates to combustion engines utilising heavy fuel oil as a fuel. In the body of the device there is arranged a chamber, in which a movable piston is arranged dividing the chamber into a first main volume and a second main volume, the volumes of which depend upon the position of the piston. Moreover, the device comprises at least one auxiliary volume, which can be united with the main volumes. The auxiliary volume can be filled with the fuel entering the device through the first main volume by utilising the piston motion. By establishing a connection from the auxiliary volume to the second main volume a fuel flow to the second main volume is allowed.



---

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*